DOCUMENT RESUME

ED 147 714 CG 012 050

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TITLE Are Same-Sex Norms Inadequate in Vocational Interest Inventory Measures?
PUB DATE Aug 77
NOTE 23p.; Paper presented at the Annual Meeting of the American Psychological Association (San Francisco, California, August 26-30, 1977)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Attitudes; Blacks; College Freshmen; Females; *Group Norms; Norm Referenced Tests; *Occupational Aspiration; *Racial Differences; Research Projects; Self Concept; *Sex Differences; *Social Differences; *Vocational Interests

ABSTRACT

The purpose of this study was to determine whether characteristics, attitudes, and self-ratings of males and females as distinct categories showed greater differences than those of two other distinct categories--blacks and whites. A representative national sample of college freshmen with career aspirations in three different areas was divided into four groups on the basis of their race and sex. The results of three discriminant analyses performed separately for students in each occupational category revealed that race was a more important determinant of group difference than was sex. The findings suggest that if norms are to be used, then other criteria such as race, socioeconomic status, and age should also be considered as potential moderator variables in the development of same-sex norms. (Author)

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ED147714

Are Same-Sex Norms Inadequate in Vocational Interest Inventory Measures?

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Paper prepared for presentation at the annual meeting of the American Psychological Association, August, 1977.
The author is indebted to Helen S. Astin for her valuable suggestions concerning this study.

CG012050

Abstract

The purpose of this study was to determine whether characteristics, attitudes, and self-ratings of males and females as distinct categories showed greater differences than those of two other distinct categories—blacks and whites. A representative national sample of college freshmen with career aspirations in three different areas was divided into four groups on the basis of their race and sex. The results of three discriminant analyses performed separately for students in each occupational category revealed that race was a more important determinant of group differences than was sex. The findings suggest that if norms are to be used, then other criteria such as race, SES, and age should also be considered as potential moderator variables in the development of same-sex norms.

Are Same-Sex Norms Inadequate in Vocational Interest Inventory Measures?

Various studies have reported that there are systematic sex-stereotypic differences in the way males and females respond to many items on vocational interest inventories (Flanagan, 1971; Holland, 1973; Prediger, Roth, and Noeth, 1973; Roth, Hanson, and Cole, 1973; Hanson, 1974; Prediger and Hanson, 1974). A disproportionate percentage of men as contrasted to women manifest interests associated with male-stereotypic occupations (e.g., business, management, sciences, technical) and a disproportionate percentage of women as contrasted to men exhibit interests aligned with female-stereotypic occupations (e.g., social sciences, creative arts, social services). The rather consistent finding that differences in male and female interests are patterned in the differences in sex-role socialization has led some to view the practice of comparing scores of males with scores of females as sex-restrictive and possibly sex-biased (AMEG, 1973; Harmon, 1973; National Institute of Education, 1974; Prediger and Hanson, 1974; Diamond, 1975).

An interest inventory is viewed by many as sex-restrictive if it discriminates against the sexes in the career options it suggests. More specifically:

> An interest inventory is sex-restrictive to the degree that the distribution of career options suggested to males and females is disproportionate. Conversely, an

> interest inventory is not sex restrictive if each career option covered by the inventory is suggested to similar proportions of males and females (Prediger and Hanson, 1974, p. 97).

Given the rather consistent reports of systematic differences in the interest patterns of females and males, the practice of suggesting careers to individuals on the basis of how their interests compare to the interests of all other persons who responded to the inventory (combined sex scores) would, according to this definition, render most vocational assessment inventories sex-restrictive.

An alternative method of interpreting interest inventory scores, thought to minimize bias introduced by differences in sex-role socialization and to increase the range of occupations recommended to members of each sex, is to compare an individual's responses with those of members of his or her own sex (same-sex norms). Several investigators (Cole, 1973; Hanson, 1974; Prediger and Hanson, 1974) have demonstrated that when same-sex norms are used, the distribution of occupations recommended to females is highly similar to the distribution of occupations recommended to males. However, when combined sex norms were used for the same samples, the distribution of recommended occupations for males and females were often quite dissimilar. These findings, in combination with the movement for equality among the sexes, have resulted in increased pressure on test developers, publishers, and users of interest inventories—who do not already so so—to provide separate norms

for each sex.

If differences in the socialization of males and females necessate the need for same-sex norms, then one must also consider evidence which indicates that other factors such as race, ethnicity, and socioeconomic status (SES) also have a differential effect on the socialization of groups in America and, as such, can introduce systematic bias in the way groups respond to many interest inventory items. In fact, research reviewed by Gump and Rivers (1975), as well as by others (Miller and Dreger, 1973; Dreger and Miller, 1968) raises the possibility that differences in the socialization of various groups within each sex category may be a more important determinant of interests than differences in socialization between the sexes. Therefore, if there are differences in the socialization of various groups within a sex category (e.g., high SES blacks, low SES Orientals), then the possibility that a disproportionate distribution of career options may be suggested to any two groups must be considered.

In sum, if the decision is made to use normative data, and if substantial differences in the interest patterns of various race and SES groups are known to exist, then it may be more appropriate to report norms for different race and SES groups within each sex category than to limit the comparisons to the less homogeneous group of a single sex.

Purpose

The purpose of this study was twofold: (1) to determine whether there were differences in the characteristics (social/political attitudes, life goals, self-assessments of skills, and work values) of males and females of different racial groups (white and blacks in this particular sample) preparing to enter similar occupations; and, if so, (2) to determine whether there were greater differences in the characteristics of students when grouped according to sex or when grouped according to race.

Method

Subjects

A random sample of 10,000 students selected from the entire population of 232,400 full-time, first-time freshmen entering college in 1974 who completed the Cooperative Institutional Research Program's Student Information Form (Astin et al., 1974) was used in this study. The Student Information Form (SIF) is designed to elicit a wide range of biographic and demographic data, as well as information on students' career plans, interests, current socio-political attitudes, values, and self-assessment of their intellectual, social, and personal skills and dispositions.

Instrumentation

Thirty-two measures, derived from the SIF, constituted the predictor variables in this study. These variables were

designed to differentiate among the four criteria groups in the series of stepwise multiple discriminant analyses conducted. Nineteen of the variables were based on responses to individual items assessing student background characteristics (age, degree aspirations, parental income, mother's and father's education), self-rating of abilities (public speaking, mechanical ability), interpresonal skills (understanding of others, defensiveness, stubbornness, drive to succeed, sensitivity to criticism), political views and work values (avoid pressure, work with ideas, have a great deal of independence). The remaining 13 predictor variables were in the form of scales derived from factor analysis. The scales measured aspects of students' life goals, work values, self-assessment of intellectual skills, and current socio-political attitudes.

Procedure

Four groups formed on the basis of students' race and sex constituted the criteria groups for the discriminant analyses. They were black males, black females, white males, white females. The small sample size prohibited the inclusion of other ethnic/racial groups.

Eight occupational categories were formed on the basis of students' stated probable future careers. Separate stepwise multiple discriminant analyses were performed for students in three of these occupational categories. They were

Business, Education, and the Medical Professions (M.D., optometrist, pharmacologist, veterinarian).

Results

Table 1 presents a summary of the results to the stepwise multiple discriminant analyses which tested for differences among students of different race/sex groups whose career aspirations were in Business, Education, or the Medical Professions. Each of the three discriminant functions yielded two significant discriminant functions (X^2; p .05). The final Wilks' lambda associated with these analyses ranged from .630 (Business) to .640 (Medical Professions) to .665 (Education). These findings indicate that the predictor variables were able to produce a moderate degree of separation among the groups. (The larger the lambda, the less the discriminating power.) These findings, along with the moderately high canonical correlation coefficients associated with each of the discriminant functions, indicate that there was a considerable amount of variation among sutdents in the four race/sex groups preparing to enter similar occupational areas.

A more direct answer to the questions raised in this study can be obtained by examining the rank order of the group centroids on the respective functions. (The centroids summarize the group location in the reduced space defined by the discriminant function. The group centroid is the mean

TABLE 1

CENTROIDS OF GROUPS IN REDUCED SPACE FOR BUSINESS, EDUCATION, AND MEDICAL PROFESSIONS (Race/Sex Groups)

Business

Rank Order	First discriminant function (54.54%)	Second discriminant function (39.78%)
1	1.30 Black male	.29 White male
2	.38 Black female	-.28 White female
3	.11 White male	-.58 Black male
4	-.58 White female	-1.24 Black female
Wilks' lambda:	.63	.80
Canonical R:	.46	.41

Education

Rank Order	First discriminant function (60.17%)	Second discriminant function (32.62%)
1	1.99 Black males	.92 Black female
2	.66 Black female	.21 Black male
3	.31 White males	.07 White female
4	-.25 White females	-.55 White male
Wilks' lambda:	.665	.845
Canonical R:	.46	.36

Medical Professions

Rank Order	First discriminant function (53.0%)	Second discriminant function (39.16%)
1	1.09 Black female	1.49 Black male
2	.49 Black male	.77 Black female
3	.48 White female	.03 White male
4	-.35 White male	-.35 White female
Wilks' lambda:	.64	.81
Canonical R:	.45	.39

discriminant score for each group.) If sex had a greater influence in differentiating groups than did race, the group centroids associated with race would be closer together than the group centroids associated with sex. Conversely, if race had a greater influence in differentiating the groups than did sex, then there would be a greater separation between the group centroids associated with race than with sex.

The results reported in Table 1 reveal that the degree of separation between the group centroids for race was, in all cases, greater than the degree of separation for sex. For example, the first discriminant function for students desiring a career in Business demonstrates a great deal of separation between the group centroids of black males (1.30) and white males (.11) and a great deal of separation between the group centroids of black females (.38) and white females (-.58). Together, these findings demonstrate that race was a more important determinant of group differences than was sex.

Another approach which can be used to determine whether there were greater differences in the characteristics of students when grouped according to sex or when grouped according to race is the statistical procedure of classification analysis. By classification is meant the process of identifying the likely group membership of a case when the only information known is the case's values on the discrimi-

nating function. Since the actual group membership of each student is known, the use of classification analysis provides information on the effectiveness of the discriminating variables to predict group membership and -- of moment to this study -- the percentage of students in each race/sex group whose characteristics more closely resembled the characteristics of students in one of the other three race/sex groups.

If sex was a more important determinant of group differences than race, then the percentage of males misclassified as females and the percentage of females misclassified as males would exceed the percentage of black students misclassified as white students and the percentage of white students misclassified as black students.

The results of the classification analyses for students in the three occupational preference categories of Business, Education, and the Medical Professions are presented in Table 2. The percentage of students correctly classified into their respective race/sex group ranged from a low of 55.2% in Education to a high of 55.9% in the Medical Professions. Inspection of the classification table for each of the occupational categories reveals that the percentage of misclassified students within each race group was higher than the percentage of misclassified students within the same sex group. For instance, the percentage of white females in Business who, on the basis of their responses

TABLE 2

HITS AND MISSES CLASSIFICATION ANALYSIS FOR BUSINESS, EDUCATION, AND MEDICAL PROFESSIONS (Race/Sex Groups)

Business

N	Race-sex group	White males	Black males	White females	Black females
643	White males	52.7	13.2	24.4	9.6
66	Black males	18.2	60.6	4.5	16.7
311	White females	18.6	6.8	59.2	15.4
50	Black females	4.0	16.0	16.0	64.0

Percent of "grouped" cases correctly classified: 55.61

Education

N	Race-sex group	White males	Black males	White females	Black females
211	White males	52.6	11.8	19.9	15.6
29	Black males	0.0	72.4	3.4	24.1
667	White females	24.4	4.2	55.2	16.2
63	Black females	9.5	12.7	20.6	57.1

Percent of "grouped" cases correctly classified: 55.26

Medical Professions

N	Race-sex group	White males	Black males	White females	Black females
496	White males	56.9	11.5	22.4	9.3
36	Black males	5.6	63.9	5.6	25.0
261	White females	25.7	8.8	51.3	14.2
28	Black females	0.0	3.6	25.0	71.4

Percent of "grouped" cases correctly classified: 55.91

to the Student Information Form, were classified as white males (18.6%) exceeded the percentage of white females classified as black females (6.8%). Similarly, the percentage of white males in Business classified as white females (24.4%) exceeded the percentage of white males classified as black males (13.2%). In other words, students of the same race, male or female, resembled each other more than did students of the same sex, but of a different race. This finding provides additional support for the contention that race is a more important determinant of group differences than sex.

While the relative position of the group centroids and the results to the classification analyses demonstrate that race was a more important determinant of group differences than sex, these analyses do not provide information as to how the groups differed. This question can be addressed by examining the predictor variables with the largest positive and largest negative weights on the discriminant functions associated with an occupational category. The weight associated with each variable serves to identify its relative ability to differentiate the race/sex groups along the discriminant function (dimension) in question.

Since the primary concern of this study is on the macro issue of whether race was a more important determinant of group differences than sex, and not on the micro issue of how the four race/sex groups in each of the occupational

categories differed, the decision was made to report the results for only one occupational category, Business. This group was selected as an example because many of the variables which separated the race/sex groups in this category also separated the race/sex groups in the remaining two occupational categories.

Business

The first discriminant function (Table 1) separated black students from white students, with the greatest amount of separation occurring between black males (1.30) and white females (-.58). The predictor variables with positive weights on this dimension (Table 3) demonstrate that black males -- and to a lesser extent black females -- with career aspirations in business were more likely than their white counterparts to be older and to support Egalitarian Policies which would narrow inequality among persons (e.g., favor preferential treatment in college for disadvantaged students; favor open admissions), be in favor of Liberal Social Attitudes (e.g., premarital sex and the legalization of marijuana).

The predictor variables with negative weights on this dimension reveal that white females were more likely than the rest of the students to come from a higher SES background, to rate themselves as above average in mechanical ability, and to express greater dissatisfaction with the

TABLE 3

STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS
(for Business)

Weight	First discriminant function	Weight	Second discriminant function
.38	Liberal societal attitudes	.39	Parental income
.36	Liberal social attitudes	.31	Conservative societal attitudes
.27	Age	.23	Drive to achieve
.17	Understanding of others	.22	Liberal social values
.16	Stubbornness	.16	Sensitivity to criticism
.13	Societal/political concern	.15	Mother's education
.12	Intrinsic interest in field	.15	Understanding of others
-.17	External controls	-.09	Administrative control over student affairs
-.19	Parental income	-.18	Political conservatism
-.21	Government protection	-.19	Academic ability
-.28	Father's education	-.22	Government support of higher education
-.38	Mechanical ability	-.46	Mechanical ability

Note. Only weights with the highest and lowest loadings are shown.

Federal Government's efforts to control pollution and protect consumers.

The second discriminant function (Table 1) separated white males (.29) from black females (-1.24), black males (-.58), and, to a lesser extent, white females (-.28). The predictor variables with positive weights on this dimension (Table 3) indicated that white males were more likely than black females and black males to come from higher SES backgrounds, to hold Conservative Societal Attitudes (e.g., favor traditional attitudes concerning women's role in the home, and second-class status in work; believe that there is too much concern in the courts for the rights of criminals), to rate themselves higher on drive to achieve, and be in support of premarital-sex and legalization of marijuana (Liberal Social Attitudes).

The predictor variables with negative weights on this dimension show that black males and black females were more likely than their white counterparts to rate themselves higher both in mechanical and academic ability. The black students also expressed greater support for the idea of increased federal and state support of higher education.

Discussion

The results of this study demonstrate that race was a more important determinant of group differences than sex among freshmen in each of three diverse career aspiration

categories examined. This finding suggests that same-sex norms may be too heterogeneous to make accurate and fair comparisons between certain groups. For instance, had same-sex scores been used in the present study, a mismatch would have resulted with scores of black females being compared to scores of white females and scores of black males being compared to scores of white males where the more appropriate comparison would have been between males and females of the same race and, better yet, between members of the same sex and race group. Needless to say, use of an inappropriate norm reference group may operate to produce a biased and distorted interpretation of the vocational interests of some minority group members whose scores are inappropriately compared to the scores of the majority group.

Since most vocational interest inventories report only separate norms for each sex, it should be considered that the comparing of the scores of males or females in a minority group with the scores of their counterparts in the majority group may result in a disproportionate distribution of career options recommended to each group. If individual interests are determined by many interacting variables (e.g., sex, race, SES, age), then a focus on any one trait is likely to lead to limited prediction and generalizations.

A related issue concerns the extend norms which should be provided for variables on which individuals are likely to differ (e.g., age, sex, ethnic/racial identification, SES),

in order to provide similar distributions of suggested careers to various subgroups. This issue was addressed by Gump and Rivers (1975) who noted:

> "Women" ("men") . . . are a nonhomogenous group, and it seems inappropriate to proceed as if differences in age, race, and socioeconomic class are nonsignificant. When differences are powerful as these are ignored, it is usually to the detriment of those who are not in the majority (p. 125).

If norms are to be used, then efforts should be made to identify the most appropriate groups for which they should be provided. The answer to the question of whether norms should be used at all and, if so, whether they should be provided for members on the basis of (a) sex; (b) sex and race; (c) sex, race, and socioeconomic origins; (d) sex, race, SES, and age; or (e) any other relevant combination of moderator variables should be guided by the response to another more basic question: What are the specific goals, purposes, or objectives for assessing the vocational interests of a particular individual?

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